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OCTOBER 31.

The President, Dr. RUSCHENBERGER, in the chair.

Thirty-five members present.

A paper entitled "Descriptions of Vertebrate Remains chiefly from the Ashley Phosphate Beds of North Carolina," by Jos. Leidy, M.D., was presented for publication.

Self-fertilization in Mentzelia ornata.—Mr. THOMAS MEEHAN referred to an objection made during his remarks on this plant some weeks ago, that a flower which had produced a perfect capsule under a gauze bag to exclude insects, might yet not produce perfect seeds. The capsule was now ripe, and the seed perfect.

Direct Growth Force in Roots.—Mr. MEEHAN spoke of the direct growth-force in roots, as illustrated by some specimens of the White Hickory (*Carya tomentosa*) exhibited. The Hickories during the first few years of their growth developed far more beneath than above the surface. He had seen Pecan Nuts (*Carya olivæformis*), with weak stems not two feet high, have tap roots six feet long. In the one year hickory now exhibited, the tap root was three times the length of the stem. In one plant, however, the young radicle, instead of pushing through the cleft made by the separated shell, had been directed into the shell, and in its fruitless effort to penetrate the wall, had lingered so long, that the upper portion had grown so large as to prevent egress. The root, therefore, instead of making a slender growth of eighteen inches long, had simply made a bulb of about three quarters of an inch in diameter with the shell of the nut attached to it.

Interpretation of varying Forms.—Mr. THOS. MEEHAN said that William Bartram, in the last century, had found forms of *Liriodendron tulipifera* on the Schuylkill River, as he had been informed by his son-in-law, with entire leaves, but only this year had he succeeded in discovering them. Some of these leaves he exhibited. He observed that years ago, such discoveries had an interest in themselves. Now the botanist expected to find entire leaved forms among kinds usually lobed, or lobed ones among the entire leaved class; the only value now in these discoveries is in any lesson they might teach. As a rule, he hesitated to refer to the unpublished observations of others, preferring that the discoverers should in their own good time and way, report what they had found; but hoped to be pardoned on this occasion, for saying that on a recent visit to the Academy, the distinguished botanist Dr. Engel-

mann had pointed out that some oaks had lobed leaves even in early infancy, while others had entire leaves, but that those which had the early lobed leaves assumed more entire leaves when mature, and those which had entire leaves when young, had lobed leaves when fully grown. In many oaks which he had examined he found Dr. Engelmann's observation correct, and that it extended to many other plants. The mulberries generally had lobed leaves in their younger years, but when mature the leaves were uniformly entire; and this was especially well known in the case of the *Broussonetia*. In young Japan Honeysuckles the leaves were querciform or variously lobed, while at maturity the tendency to union was often remarkable. In the common ivy the halbert-shaped leaves of youth, always gave place to lobeless forms when of fruiting age. But it was in cruciferous plants that the differences were best seen. Here lyrate or pinnatifid leaves in infancy often gave place to entire ones as the plant grew, while there were numberless instances in which entire juvenescent leaves gave place to pinnatifid ones in adolescence. However, the point for the present evening was, that there was often a vast difference between the leaves of a plant's early life, and their form in advanced age. In Coniferæ he said this was well known. During the first few months from seed, the different species in their several subdivisions were so nearly alike, that it was almost impossible to tell any one apart till a little age had brought divergence from the original type. He exhibited some young *Thujas* to illustrate this. The early *Thujas* all had ericoid leaves. In the forms which we knew as *Arbor Vitæ*, the condition which we were familiar with was the secondary form. In these the leaves, which in juvenescence were free and heath-like, had become almost wholly united with the branches. But there were cases where the young *Arbor Vitæ* had never had power to leave their early condition. They were the analogues of what we know in human nature as imbeciles or feeble minded; and of this class were many so-called "*Retinesporas*," *Biota Meldensis*, and many *Junipers* and *Thujas*. He had known the *Thuja ericoides* of gardens remain fifteen years in this infantile state, and then only one of thousands to regain the pure adolescent or fan-like *arbor vitæ* form. In all these cases it is important to notice that a comparative feebleness of growth, and an absence more or less total of all disposition to produce flowers, go with these continuously juvenescent characters. With the appearance of sexual characters, there is a change of form; and, in proportion as this change is the more marked, is the relative productiveness. The White Oak (*Quercus alba*) which, during its first year, has entire leaves, has them lobed at maturity; and the trees which have them the most deeply lobed are the most productive in acorns.

He found these observations to hold good in the entire leaved *Liriodendron*. During the first year all tulip trees had entire

leaves, or at least more or less so in comparison with those which they afterwards assume. These large trees with entire leaves had merely retained their juvenescent form. The other attendant characters of juvenescence were also present. The tree from which the large entire leaf exhibited was taken had no signs of ever having borne seeds. In one place he found two trees which, from surrounding circumstances, he should judge were probably about the same age, and in every circumstance relating to nutrition equally favored, one with very deeply cut leaves even to the most feeble branch was covered with seed cones, and was thirteen feet in circumference. The other had leaves almost entire, with but few fruit, and a trunk of only eight feet round.

The danger was that in discussing laws of variation in connection with the origin of species we may overlook these sexual and physiological changes. If one never having seen a Baltimore oriole should notice particularly the brilliant plumage of the male bird, and, without noticing the sex, compare it with the very different looking female bird, he would be very apt to think he had found a "missing link" in a grand evolutionary chain. There were many differences in animals which were recognized as having their origin in obscure sexual laws, as well as many more unrecognized but probable; and he believed these cases were far more numerous in vegetation, and they would have to be carefully eliminated from consideration in any study on the origin of species or the evolution of form in relation thereto.

Edwin A. Barber, H. F. Whitman, and Dr. W. Forwood, U. S. A., were elected members.

Col. W. L. Ludlow was elected a correspondent.

The following papers were ordered to be printed:—